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DISTRICT TOWN AND COUNTRY PLANNING
KANCHIPURAM DISTRICT

No.33I/95 Kottrampalayam Street, Near Rangasamikulam,
(Old Employment Office)Kancheepuram -631 501.
Phone No.044-27227937, E-mail: ddkanchidtcp@gmail.com.

. This is to certify that the Thiru/Tmt. / M/S. **V.SABARISH** has enrolled as **Structural Engineer Grade-II (SE)** with District Town and Country Planning, Kanchipuram. who has qualification of **B.E (Civil Engineer)** and experience in the relevant field for 4 years.

He / She has been given the Registration No. **SE/Gr.II/005/2021** on **10.03.2021**. He/She shall be required to comply with the duties and responsibilities prescribed by the Government of Tamil Nadu in Part V, "Registration of Professionals", Tamil Nadu Combined Development and Building Rules, 2019 approved vide G.O.(Ms) No.18/ MAWS (MA1) Dept. Dated. 04.02.2019.

This Registration is valid up to **9 .03.2026**.



10.3.21

Deputy Director (I/C)
District Town and Country Planning
Kanchipuram

Er. V. SABARISH, BE(Civil)
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Annexure – XIV

[See rule 51 (3)]

Form 1

Structural Design Basis Report

(1) This report to accompany the application for Building Developments

Part1	General Data		
S.No.	Description	Information	Notes
1.	Site Address	At Plot No: 10, Old S.No :87/3pt, New S.No: 87/15A1B, Kanathur, Reddikuppam Village, Chengalpattu District.	
2	Name of Owner	M/s . ARIMA BUILDERS & TECHNOLOGIES PVT LTD Mr. NARAYANA SAMY MARIMUTHU	
3	Name of Registered Developer along with the Registration Number		
4	Name of Registered Architect/Engineer along with the Registration Number	Mr. ATHI BAHAVATHI CGLDIST RE/GR-I/2023/10/011	
5	Name of Registered Structural engineer along with the Registration Number	Mr.V.SABARISH SE/GR-II/005/2021	
6	Use of the building	Residential	
7	Number of stories above ground level (including storeys to be added later, if any)	Stilt + 3 Floors	
8	Number of basements below ground level	Nil	
9	Type of structure Load bearing walls R.C.C. frame R.C.C. frame and Shear Walls Steel frame	R.C.C Frame	
10	Soil data Type of soil Design safe bearing capacity	Silty Sand 150 KN/ M^2	IS:1893 C1.6.3.5.2 IS: 1904 IS: 1892 IS: 2131
11	Dead loads (unit weight adopted) • Earth • Water • Brick masonry • Plain cement concrete • Reinforced cement concrete • Floor finish • Other fill materials	18KN/M^3 20KN/ M^3 23KN/ M3 24KN/ M3 20KN/ M3	IS: 875 Part 1
12	Imposed (live) loads		

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	Floor loads Roof loads	2.5KN/ M^3	IS: 875 Part 2
13	Cyclone/Wind • Speed • Design pressure intensity	40 M/Sec 120Kg/M^2	IS: 875 Part 3
14	Seismic zone	III	IS: 1893 (2002)
15	Importance factor	1.2	IS:1893(2002) Table 6
16	Seismic zone factor (Z)	0.16	IS:1893 Table 2
17	Response reduction factor	4	IS:1893 Table 7
18	Fundamental natural period – approx.		IS:1893 C1.7.6
19	Design horizontal acceleration spectrum value (A_h)		IS: 1893 C1.6.4.2
20	♠ Expansion/Separation Joints		
21	Building is regular/irregular	Regular	IS 1893

♥ Enclose detailed drawings drawn to scale for each floor

♦ In case terrace garden is provided, indicate additional fill load and live load along with the detailed drawings drawn to scale

Part 2	Load bearing masonry buildings		
Sl.No.	Description	Information	Notes
1	Building category		IS: 4326 C1.7 Read with IS:1893 Zone / Bldg. — II III IV V Ordinary — B C D E Important — C D E E
2	Basement Provided		
3	Number of floors including Ground Floor (all floors including stepped floors in hill slopes)		
4	Type of wall masonry	Brick Masonry	
5	Type and mix of Mortar	R.C.C-1:2:4	IS: 4326 C1.8.1.2
6	Re: size and position of openings (See note No.[i]) • Minimum distance (b5) • Ratio $(b_1+b_2+b_3)/l_1$ or $(b_6+b_7)/l_2$ • Minimum pier width between consequent opening (b_4) • Vertical distance (h_3) • Ratio of wall height to thickness 4 Ratio of wall length between cross wall to thickness		IS: 4326 Table 4, Fig.7

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7	Horizontal seismic band • at plinth level • at window sill level • at lintel level • at ceiling level • at eave level of sloping roof • at top of gable walls	P IP NA G.L 1.0M 7.0M 10.0M	(see note No.2) IS:4326 C1 8.4.6 IS: 4326 C1 8.3 IS: 4326 C1 8.4.2 IS: 4326 C1 8.4.3 IS: 4326 C1 8.4.3 IS: 4326 C1 8.4.4
	• at top of ridge walls		
8	Vertical reinforcing bar at corners and T junction of walls at jambs of doors and window openings		IS: 4326 C1 8.4.8. IS: 4326 C1 8.4.9
9	Integration of prefab roofing/flooring elements through reinforced concrete screed.		IS:4326 C1 9.1.4
10	Horizontal bracings in pitched truss in horizontal plane at the level of ties in the slopes of pitched roofs		

Notes: (i) Information in Item 6 should be given on separate A4 sheets for all walls with large number of openings

(ii) IP indicated "Information Provided"

IP indicates "Information to be provided"

NA indicates "Not Applicable"

Tick mark one box

Part 3	Reinforced concrete framed buildings		
Sl. No.	Description	Information	Notes
1	Type of building • Regular frames • Regular frames with Shear Walls • Irregular frames • Irregular frames with Shear Walls • Soft storey	Regular	IS: 1893 C1 7.1
2	Number of basements	--	
3	Number of floors including ground floor	04	
4	Horizontal floor system • Beams and slabs • Waffles • Ribbed floor • Flat slab with drops • Flat plate without drops	Yes	

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5	Soil data • Type of soil • Recommended type of foundation -Independent footings -Raft -Piles • Recommended bearing capacity of soil • Recommended type, length, diameter and load capacity of piles • Depth of water table • Chemical analysis of ground water • Chemical analysis of soil	Silty Sand Isolated Yes 150KN/m^2 - 2.5m - -	IS: 1498
6	Foundations Depth below ground level Type Independent Interconnected Raft Piles	1.2 M Isolated	
7	System of interconnecting foundations Plinth beams Foundation beams	Plinth	IS: 1893 C1 7.12.1
8	Grades if concrete used in different parts of building	M20	
9	Method of analysis used	Yes	
10	Computer software used	Yes	
11	Torsion included	Yes	IS: 1893 C1 7.9
12	Base shear a. Based on approximate fundamental period b. Based on dynamic analysis c. Ratio of a/b		IS: 1893 Cl. 7.5.3
13	Distribution of seismic forces along the height of the building.	Nil	IS:1893 Cl.7.7 (Provide sketch)
14	The Column of soft ground storey specially designed.	Nil	IS: 1893 Cl.7.10
15	Clear minimum cover provided in • Footing • Column • Beams • Slabs • Walls	 60 40 40 25 25	IS: 456 Cl. 26.4

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16	Ductile detailing of RC frame		
	• Type of reinforcement used	FE450	IS: 456 Cl. 5.6
	• Minimum dimension of beams	12mm	IS: 13920 Cl.6.1
	• Minimum dimension of columns	230x380	IS: 13920 Cl.7.1.2
	• Minimum percentage of reinforcement of beams at any cross section	2% 4%	IS: 456 Cl.26.5.1(a) IS: 13920 Cl.6.2.1
	• Maximum percentage of reinforcement at any section of beam	Nil	
	• Spacing of transverse reinforcement in 2-d length of beams near the ends	Nil	IS: 456 Cl.26.5.1.1(b)
	• Ratio of capacity of beams in shear to capacity of beams in flexure	-	IS: 13920 Cl.6.2.2
	• Maximum percentage of reinforcement in column	4%	IS: 13920 Cl.6.3.5
	• Confining stirrups near ends of columns and in beam-column joints Diameter Spacing	8mm 150mm	IS: 456 Cl.26.5.3.1
	• Ratio of shear capacity of columns to maximum seismic shear in the	Nil	IS: 13920 Cl. 7.4

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	storey.		
17	Does the features require clearance by SDRP Example: High rise building Prefab building Building in hazard prone areas	**N/A**	

Foundation

i. In case raft foundation has been adopted, indicate K value used for analysis of the raft.

ii. In case pile foundations have been used, give full particulars of the piles, type, dia, length, capacity

iii. In case of high water table, indicate system of countering water pressure, and indicate the existing water table, and that assumed to design foundations.

Idealization for Earthquake analysis

i. In case of composite system of shear walls and rigid frames, give distribution of base shear

in the two systems on the basis of analysis, and that used for design of each system

ii. Indicate the idealization of frames and shear walls adopted in the analysis with the help of sketches.

iii. Submit framing plans of each floor

iv. In case of basements, indicate the system used to contain earth pressures.

Part 4	Buildings in structural steel		
1	Adopted method of design	o Simple o Semi-rigid o Rigid	IS:800 Cl 3.4.4 IS:800 Cl.3.4.5 IS:800 Cl.3.5.6
2	Design based on	o Elastic analysis o Plastic analysis	IS: 800 Section-9 SP;6 (6)
3	Floor construction	o Composite o Non composite o Boarded	
4	Roof construction	o Composite o Non composite o Metal o Any other	
5	Horizontal force resisting system adopted	Frames Braced frames Frames & shear walls	Note: Seismic force As per IS:1893 Would depend on system
6	Slenderness ratios maintained	Members defined in Table 3.1, IS:800	IS 800; Cl.3.7
7	Member deflection limited to	Beams, Rafters Crane Girders, Purlins Top of columns	IS:800 Cl.3.13
8	Structural members	o Encased in concrete Not encased	IS: 800 Section-10
9	Proposed material	o General weld-able o High strength **N/A** o Cold formed o Tubular	IS: 2062 IS: 8500 IS: 801, 811 IS: 806
10.	Minimum metal	o Hot rolled sections **N/A**	IS: 800, Cl.3.8

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	thickness Specified for corrosion protection	○ Cold formed sections ○ Tubes	Cl.3.8.1 to Cl.3.8.4 Cl.3.8.5
11	Structural connections	○ Rivets ○ CT Bolts ○ S H F G Bolts ○ Black Bolts ○ Welding field Shop (Specify welding type proposed) Composite Not Able	IS: 800, Section-8 IS: 1929, 2155, 1149 IS 6639, 1367 IS 3757, 4000 IS: 1363, 1367 IS: 816, 814,1395, 7280, 3613, 6419, 6560, 813, 9595
12	Minimum Fire rating proposed, with method	○ Rating One hours ○ Method proposed. -In tumescent painting -Spraying -Quilting -Fire retardant boarding	IS: 1641, 1642, 1643

Part-5

Any special weakness in the building making it vulnerable for stability related failure and the precaution to be taken during execution/completion and finishing to be indicated.

Part-6

Recommendations of structural Engineer with respect to special requirements needed with respect to structural safety and stability to be taken note of by competent authority feature like incorporation of swimming pool, heavy load on roof, prefabricated structure or any other hazardous features should be included.

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Ref No : Stab/Adhi/Kanathur/03/05

STRUCTURAL STABILITY CERTIFICATE

STRUCTURAL STABILITY CERTIFICATE FOR THE PROPOSED CONSTRUCTION OF STILT FLOOR +3 FLOORS RESIDENTIAL BUILDING (HEIGHT-12.00m) WITH 18 DWELLING UNITS AT PLOT NO.10, COMPRISED IN OLD S.NO:87/3pt, S. NO:87/15A1B (NEW) AS PER PATTA NO : 4985 AT KANATHUR REDDY KUPPAM VILLAGE , THIRUPORUR TALUK AND PANCHAYATH UNION , CHENGALPATTU DISTRICT.

This is to Certify that the Proposed Residential Building (RCC Roof) consists of (Stilt + 3 Floors) = 4 Floors only.

This Proposed building site has been inspected by me and the required details such as soil Report & other details etc. have been collected and foundation details are enclosed here with.

The Proposed Residential Building which has been designed as per Bureau of Indian Standard viz. IS 456:2000 for Plain and Reinforced Concrete, IS 875(Part II)—1987 for Imposed Loads and IS 1893:2002(part 1) for Seismic Force. (Stilt + 3 Floors) = 4 Floors only. So, I here by certify that the Building will be structurally safe. No more future Vertical expansion will be allowed except stair head room etc, if necessary. (Approval Purpose only).

1. The minimum grade of concrete is M25.

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1.0 INTRODUCTION

1.1 General Project Information

Project Title
RESIDENTIAL BUILDING CONSISIT OF STILT AND 3 UPPER FLOORS

Location of Project
PLOT NO: 10, KANATHUR REDDIKUPPAM

Project Description
RCC Framed Building consisting of Stilt and three Upper floors

1.2 Purpose of Basis of Design Document

This document details the input data, principles, methods and performance criteria to be used in the structural engineering design of the Project.

The document serves as a plan for the basis of justification and calculations associated with the design and are a repository for all relevant structural information, including references and computer programs pertaining to the project.

The contents of this brief is based on the drawings available at time of design and actual structural working drawings may change to suit latest architectural design at time of construction.

1.3. Structural Design

The main considerations followed for the design of structure are:

(a) Structural safety and stability.
(b) Demands of aesthetics conceived by the architect.
(c) Availability of material, equipment and expertise.
(d) Constructability and ease of maintenance.
(e) Durability.
(f) Economy.
(g) Recyclability.

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2.0 STRUCTURAL SYSTEM

This section provides an overview of the selected structural system and the structural concept employed for the Project. The stability of each building against imposed lateral loads, namely seismic loads /wind load is provided by RCC columns.

RCC BUILDING - REINFORCED CONCRETE STRUCTURE

2.1.1 Foundations

The design options for Foundation shall be worked out based on the Soil test report shared by client. The foundations are to comprise of Individual Footing.

2.1.2 Superstructure - Gravity System

The load resisting system is to be framed utilising RCC slabs and beams with columns. Frames are classified as Ordinary Moment-Resisting Frames (OMRF).

2.1.3 Expansion joint

As the total length of the building is found to be not more than normal condition it is found that expansion joint is not necessary.

2.1.4

Seismic loads and earthquake resistant design shall be as per IS 1893(Part-1). Earthquake forces shall not be considered to act at the same time as wind forces. Direction of earthquake loading and combination thereof shall be as per clause 6.3.2 of IS 1893(Part-1).

Zone : III (For Chennai)
Zone factor : 0.16
Importance factor (I) : 1.5
Response reduction factor (R) : 5.0
Avg. response acceleration coefficients (Sa/g) : As per soil condition
The building is designed by static analysis

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3.0 DESIGN CODES, STANDARDS AND REFERENCE DOCUMENT

3.1 Codes, Standards and Commentaries

a) IS 456 - 2000 Plain and Reinforced Concrete structures
b) IS 875 - 1987 Design Loads
c) IS 3370 Part I, Part II and Part IV Concrete Structures for storage of liquids
d) SP 16 Design aids for Reinforced Concrete structures
e) SP 34 Concrete Reinforced & Detailing
f) IS 1786 Specification for high strength deformed bars
g) National Building Code of India 1983
h) IS 13920 -2016 for Seismic detailing

3.2 Design References and Guides

a) Reinforced Concrete Design -SP 16 BIS handbook
b) Reinforced Concrete Designers Handbook

3.3 Specification used

All the buildings have been designed as framed structures in accordance with the relevant Indian Codes of Practice for civil works i.e. IS: 456-2000. Seismic detailing is followed for the entire building wherever found to be necessary.

4.0 LOADSCRITERIA

The structure is analyzed for all possible combinations of loads i.e. gravity loads(dead and live loads). It should be noted that no extra provision has been made in the design of foundation and vertical structural elements for additional floors.

4.1 MATERIAL DEAD LOADS

Item	Density (kN/m^3)	
Dense Concrete	25	
Steelwork	78.5	
Soil	18.0	
Water	10.0	
225 thk Clay Brick with 8 mm plaster internal walls	20.0	

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4.2 MINIMUM IMPOSED LOADS

RESIDENTIAL BUILDINGS (KN)

a) All rooms and Kitchen	2.0
b) Toilets and bathrooms	2.0
c) Corridors, passages, lobbies and staircases including fire escapes - as per the floor serviced but not less than	3.0

IMPOSED LOADS ON ROOFS

Roofs of buildings used for promenade or incidental to assembly purposes shall be designed for the appropriate imposed floor loads given in Table for the occupancy.

4.3 WIND LOADING

The building structure is of normal high so wind load does not dominate the result of the analysis.

4.4 FIRE RESISTANCE:

Cover to main rebars will be provided as per Table 16 in BIS 456 for fire rating of 1.0 hours.

4.5 EXPOSURE:

The Building will be exposed to Moderate environment as per Table 5 in BIS456.

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5.0 REINFORCED CONCRETE STRENGTHS.

5.1 Concrete design grades are specified cube strengths to BIS

Elements	Concrete Grade Fck (N/sqmm)
Columns/Shear Walls	25
Foundations	25
Beams / Slabs	25
Lean Concrete	10

5.2 REINFORCEMENT

Reinforcement Yield Strengths used in the design of concrete elements:

Deformed Bars	500 MPa (D)

6.0 GEOTECHNICAL

Geotechnical Model and recommendations are based on report shared by the Client

The recommendations for the proposed structure (Residential building .comprising of an Stilt and three upper floors) are given below:

a) Type of Foundations : Individual footing

b) Depth of foundations : 1.2mt from the existing ground level

c) Allowable bearing pressure : 15t/m²

d) Settlement considered for calculations: <50mm

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LOAD CALCULATION FOR STILT+ 3 Floors)

The Load Calculation is done 'The Proposed Construction (Villa) of Stilt + 3 Floor Residential Building at NO.10, COMPRISED IN OLD S.NO:87/3pt, S. NO:87/15A1B (NEW) AS PER PATTA NO : 4985 AT KANATHUR REDDY KUPPAM VILLAGE.

Codes Referred:-

2. IS 456-2000 & SP-16 Code of Practice for Plain and Reinforced Concrete
3. IS 1786-1985 Code of Practice for High strength deformed steel bars& wires for concrete reinforcement
4. IS 875-1987 Code of Practice for Design loads (Part -1 for Dead load, Part -2 for imposed load, Part -3 for wind load)
5. IS 1904-1986 Code of Practice for Design of foundation in soils.

MATERIAL

[redacted]

Reinforced cement concrete
Grade of concrete - M 25
Grade of steel – Fe500
ROOF
LOADS:

Self-weight of 163 Tk. Slab 0.163x25	=	= 4.075 kN/m2
Live load		= 2.00 kN/m2
Floor Finishes		= 1.25 kN/m2
Total load		= 7.325 kN/m2

A. DEAD LOADS:

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[redacted]

Unit weight of concrete = 25 kN/m3
Unit weight of solid block = 24 kN/m3
Weathering course = 2.5 kN/m2

B. LIVE LOADS:

[redacted]

Live load on Floor = 2.00 kN/m2
Live load on staircase & passage = 4.00 kN/m2
Live load on toilet = 4.00 kN/m2
Live load on balcony = 4.00 kN/m2
(Clause 4.1, Table 2, IS 875 – Part 2)

C. SEISMIC LOADS:

Seismic loads is considered as per IS 1893 -2002.
Seismic zone- III
Zone factor- 0.15
Importance factor- 1.0
Soil type- Medium Type II
Response reduction factor- 3

All other dead & live loads are given as gravity loads. The detailing of reinforcement is done as per IS 456-2000, IS 13920:1993 and SP 34. The entire structure is analyzed for each loads and load combinations.

LOAD COMBINATIONS:

* 1.0 x DEAD + 1.0 x LIVE
* 1.5 x DEAD + 1.5 x LIVE
* 1.2 x DEAD + 1.2 x LIVE + 1.2 EQX
* 1.2 x DEAD + 1.2 x LIVE - 1.2 EQX
* 1.5 x DEAD + 1.5 EQX
* 1.5 x DEAD - 1.5 EQX
* 0.9 x DEAD + 1.5 EQX

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* 0.9 x DEAD - 1.5 EQX
* 1.2 x DEAD + 1.2 x LIVE + 1.2 EQY
* 1.2 x DEAD + 1.2 x LIVE - 1.2 EQY
* 1.5 x DEAD + 1.5 EQY
* 1.5 x DEAD - 1.5 EQY
* 0.9 x DEAD + 1.5 EQY
* 0.9 x DEAD - 1.5 EQY

DESIGN ANALYSIS:

The entire analysis is carried out using finite element package program Staad pro package for Residential building as per approval drawing. The beams and columns are modeled as frame elements and the slabs are modeled as shell element. Since the Safe bearing capacity of the soil for Isolated Footing is 15 tons/m2 at 1.20m depth, the columns are assumed to be fixed at the base. Wind loads are considered as per IS 875 Part 3 and are given as joint loads. Seismic analysis is carried out for seismic forces corresponding to zone III of seismic zones of India map as per IS 1893 -2002. Auto generation of lateral loads is done by the program itself for the corresponding seismic factors.

Design of TYP FOOTING

From Analysis the Load to the Footing are 450 KN from a square column 200x450 mm (with 16mm bar). M25 Grade of Concrete and Fe 500 steel is used and safe bearing capacity of soil is taken as 150KN/sqm as per soil report.

Maximum Load on Column = 450 KN.
Add 10% self weight of Footing = 45KN.
Total = 490 KN.

Area of Footing required $A = \frac{490KN}{150\ KN/m^2} = 3.26\ m^2.$

Providing footing size = 2.x 2. m.

Ultimate Soil reaction = P/A = $\frac{1.5 \times 490}{2m \times 2m}$

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= 183 KN/m^2

= 0.183N/sqmm.

Depth of footing for shear.

d = 0.183 x 2000 x(950-d)

=347700 - 366d.

Assume Pt = 0.12 ζc = 0.29N/sqmm.

shear resistance

V_{c1} = 0.29 x
2000xd
=580d

Vu1 ≤ Vc1
=347700-366d ≤ 580d

d ≥ 450mm Providing d=460 D=500.

Flextural moment

Mu = $wl^2/2$

= 303x4x 0.95x0.95/2 = 528KNm = 528148000Nmm.

Mu/bd^2 = 528148000/3500x640x640 = 0.61Mpa.

Pt=1.9% Ast = Ptxbxd/100 = 1.9x1000x460/100 =561 sqmm/m.

Using 10 mm rod for Footing. Spacing of bar = 1000x78.5 /561 = 140mm.

Use 10mm rod @ 125mmc/c both ways for Footing.

And Design of other Footings calculated in similar way

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Design of TYP Column

From Analysis the Column Axial load is found to be 480 KN.

The size of the column is taken as 200mmx450mm.

Grade of Concrete M30 and Grade of steel Fe500

Cover = 40mm. Ht of Column = 3mt. Fy =

500N/sqmm & Fck = 25

Effective Length ratio 0.65 as per IS 456:2000 (both end fixed)

Leff1 = 0.65 x 3 = 1.95, Leff2 = 0.65 x 3 = 1.95

Check for Slenderness

Leff1/D = 6.5 Leff1/b = 6.5 Leff2/D = 6.5 Leff2/b = 4.3

All Columns are short about both axis Size of Column

and check e_{min}

e_{min} = Leff/500+D/30 = 1950/500+300/30 = 13.9

Find Mmin = 0.031x480 = 30.38KNm.

Design Axial Load Pu = 980KN.

Design Moment Mx = Mmin = 30.38KNm.

Designing the column as an axially loaded column

with uni-axial moment

Calculation of Area of Steel.

Design Axial Load Pu =480KN.

Design Moment Mx = Pux e_{min} 30.38KNm.

d' = 40+20/2 = 50mm

d'/D = 50/300 = 0.217

$Mu/FckbD^2$ =30.38x1.5x10^6 /30x230x750x750 =

0.03 Pu/Fckbd = 480x1.5x10^3/30x230x750 = 0.43

From SP 16 Chart 44, p/Fck = 0.089

Ast = 0.089x30x200x450/100 = 1108sqmm.

Required 8 Nos of 16mm tor rods.

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For Distributing even arrangement of rod on all 4 sides of column

Also Lateral ties 8 tor rods @ 150c/c are to be Provided. And

Design of other Column calculated in similar way.

Design of TYP Beam

Beam size is taken as 200mm x 450mm.

Simply supported beam Effective span is 4.18mt

From analysis the Beam moment are as follows

Moment Top near support (left) is -224 KNm.

Moment Top near support (right) is -209 KNm.

Moment Bottom @ Mid span is +281 KNm.

Area of steel @ Top near support (left)

Mu = 0.87Ast fy d[1-(Ast fy/b d fck)]

-224000000 = 0.87 x Ast x 500 x 560[1-(Ast x 500 / 230 x 560 x 25)]

-224000000 = 243600Ast - 37.82 Ast^2

Ast = 416 sqmm.

Providing 3-16# @ Top near Left Support

Area of steel @ Top near support (right)

Mu = 0.87Ast fy d[1-(Ast fy/b d fck)]

-209000000 = 0.87 x Ast x 500 x 560 [1-(Ast x 500 / 230 x 560 x 25)]

-209000000 = 243600Ast - 37.82 Ast^2

Ast = 466 sqmm.

Providing 3-16# @ Top near Left Support

Area of steel @ Bottom near mid span

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Mu = 0.87Ast fy d[1-(Ast fy/b d fck)]

281000000 = 0.87 x Ast x 500 x 560 [1-(Ast x 500 / 230 x 560 x 25)]

281000000 = 243600Ast -37.82 Ast^2

Ast = 505 sqmm.

Providing 3-16# & 3-16# @ Bottom of Mid span

Also Stirrups 8 tor rods @ 150c/c are to be Provided.

And Design of other Beam calculated in similar way.

Design of TYP Slab

Effective span of Slab is 3.89mt x 7.2mt with beam support of 200mm spaced @ 3890mmc/c

Taking M30 Grade Concrete and Fe500 Grade steel.

Thickness of slab = 3890/35 = 111mm.

Slab thickness is taken as 125mm as the building is used for Residence purpose.

Effective depth = d = 125- 20 - 6 = 97mm.

Self wt of slab = 0.125 x 25 = 3.125KN/sqm Finish = 1.5KN/sqm.

Total Dead Load = 5.25KN/sqm.

Live load for Residence building Lobby Corridor etc = 2KN/sqm.

Partition Load on slab is taken as 2KN/sqm.

Total Load = 2+2+5.25 = 9.25KN/sqm.

Factored Load W= 1.5 x 9.25 = 13.875KN/sqm.

Coefficient in Shorter direction = 0.1149.

Shorter Span Positive moment = 0.1149 x 13.875 x 4.5 x 4.5 = 46.24 KNm.

Mu limit = 0.138 fck bdd = 0.138 x 25 x 1000 x 97 x 97 = 53 KNm Since

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Mu is less than Mu limit the section is under reinforced. Mu = 0.87Ast

fy d[1-(Ast fy/b d fck)]

46240000 = 0.87 x Ast x 500 x 124 [1-(Ast x 500/1000 x 97 x 25)]

43240000 = 53940 Ast - 8.7 Ast^2

Ast = 645 sqmm.

Provide 10 Tor @ 100mm c/c.

Coefficient in Longer direction = 0.034.

Longer Span Positive moment = 0.034 x 19.875 x 4.5 x 4.5 = 13.68 KN.m

Mu limit = 0.138 fck bdd = 0.138 x 25 x 1000 x 97 x 97 = 53 KNm Since

Mu is less than Mulimit the section is under reinforced. Mu = 0.87Ast

fy d[1-(Ast fy/b d fck)]

13680000 = 0.87 x Ast x 500 x 124 [1-(Ast x 500/1000 x 97 x 25)]

13680000 = 53940 Ast - 8.7 Ast^2

Ast = 264 sqmm.

Provide 10 Tor @ 150mm c/c.

Check for Shear.

Span load = 19.875 x 4.5 = 89 KN V = 89/2 = 44.7KN.

Actual Shear stress V = 44700/1000 x 97 = 0.36N/sqmm < Tc(min).

From IS 456 Table 19 (Using Pt = 0.65%) Design shear strength = 0.574N/sqmm.

Max Allowable shear stress = 3.95 N/sqmm.

Check for Deflection.

Actual Span to depth ratio = 4500/97 = 36.2

Calculation of Allowable Span to depth ratio.

fs = 0.58 fy (Area of c.s of steel required/ Area of c.s of steel provided)

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= 0.58 x 500(945/1120) = 244 N/sqmm.

K = 1/[0.225+0.003fs-0.625log(1/pt)].

= 1/[0.225+0.003x265-0.625log(1/0.65)].

= 1.3

Allowable Span to depth ratio = 30 x K = 30 x 1.3 = 39 < Actual ratio.

And Design of other Slab calculated in similar way.

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Report No: A-910 STABRA

STABILITY CERTIFICATE

(To be furnished while filing application for registration of building)

It is certified that the proposed construction of Stilt + 3 Floors Residential Building (Height 12.00m) with 18 Dwelling Units At Plot No: 10, Kanathur Reddykuppam. Comprised in Old S.No: 87/3Pt New S.No: 87/15A1B as per Patta No: 4985, Kanathur Reddykupam Village, Thiruporur Taluk and Panchayat Union, Chengalpattu District. is designed to resist earthquake. Check has been made and found safe and I hereby certify that :

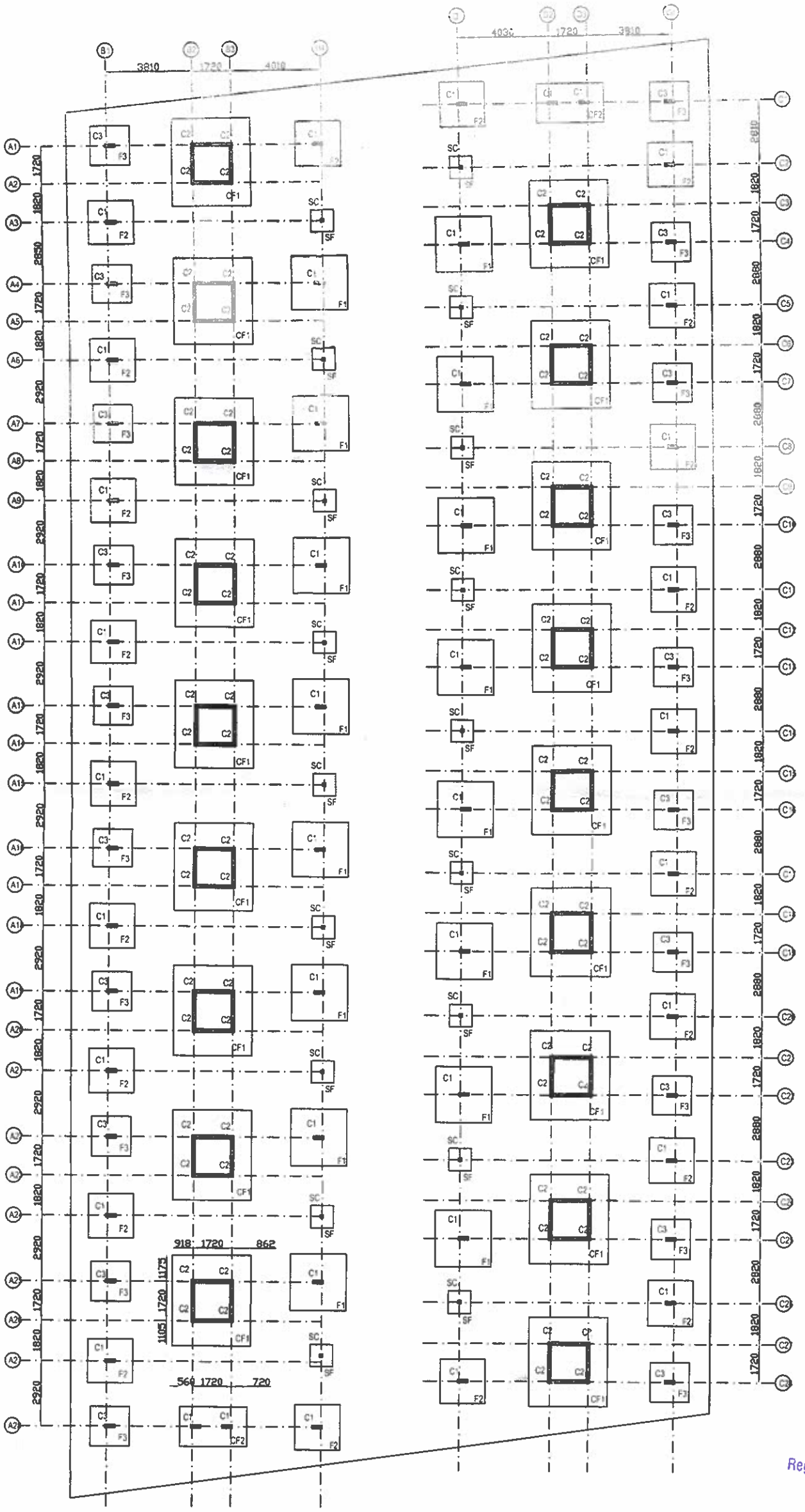
1. The minimum grade of concrete is M25

2. The design and analysis using the code of practice for plain and reinforced concrete as per IS 456, Design Loads as per IS 875:1987 (Part I, II & IV) – Code of Practice for Design Loads and Design of Earthquake resistant Structure as per IS 1983:2016-Criteria for Earthquake Resistant Design of Structures are carried out.

The building will be safe and sound when used for the purpose for which it is designated

Stamp and Signature

Encl.: Structural Design Calculation

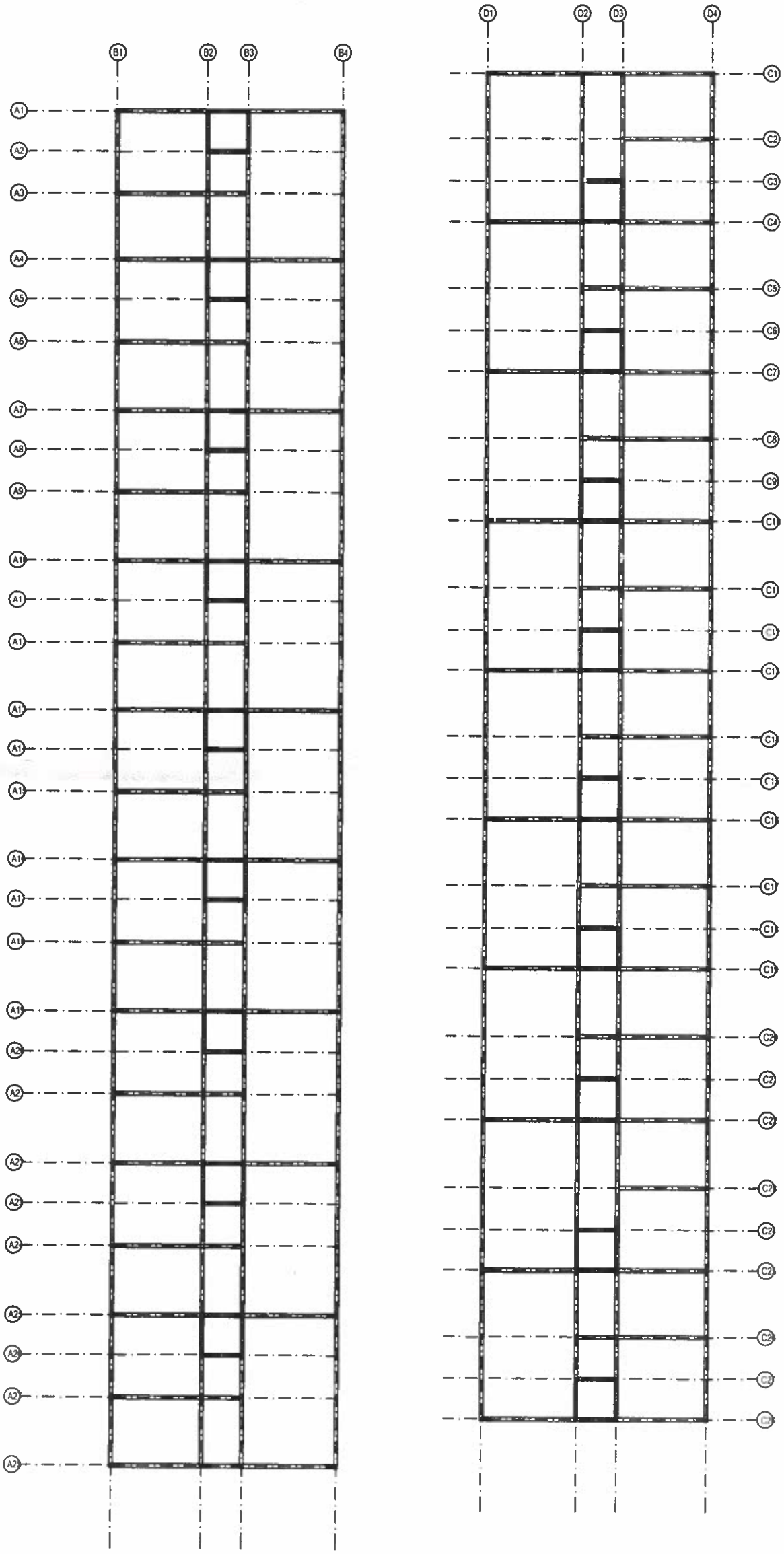


FOOTING LAYOUT

NOTES

1. All dimensions are in mm.
2. Dimensions to be read, not scaled, and to be Checked with arch. dwg only.
3. Clear cover to the main reinf. as follows
   a) Col 25mm for 12mm bars & 40mm for >12mm
   b) Footings 50mm
4. Use M30 Conc & Fe500 Steel.
5. SBC– taken as 15 T/sqm as per soil test report.
6. Foundation depth –1200mm as per soil test report.
7. Foundation designed for S+3 Flrs. only.
8. Leave dowels wherever necessary.

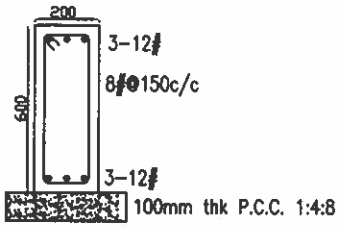
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PLINTH BEAM LAYOUT

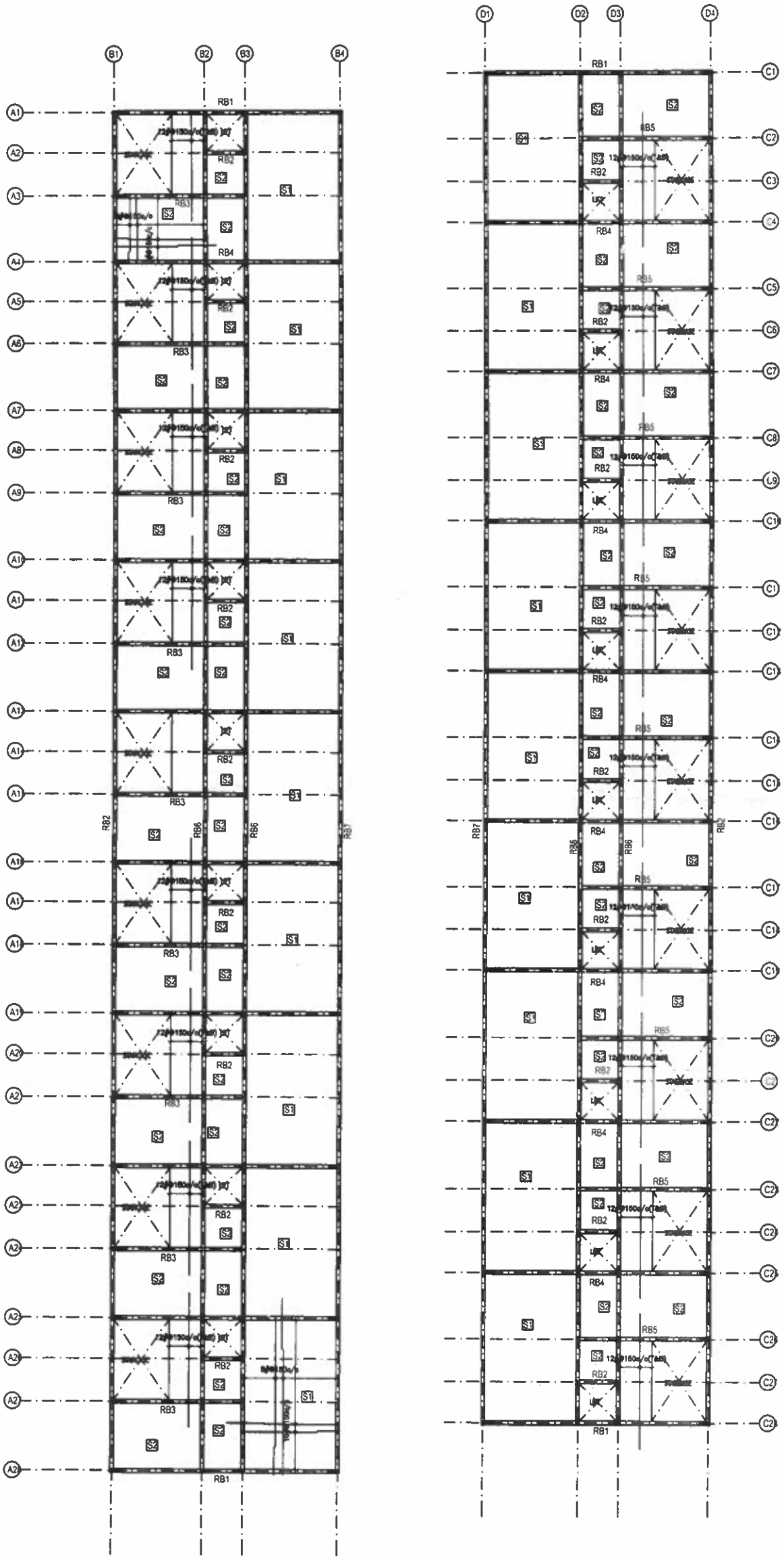
NOTES

1. All dimensions are in mm.
2. Dimensions to be read, not scaled, and to be Checked with arch. dwg only.
3. Clear cover to the main reinf. as follows
   a) Col 25mm for 12mm bars & 40mm for >12mm
   b) Plinth beam 30mm
4. Use M30 Conc & Fe500 Steel.
5. Leave dowels wherever necessary.



C.S OF PLINTH BEAM
200x600
(USE M30-Fe500)

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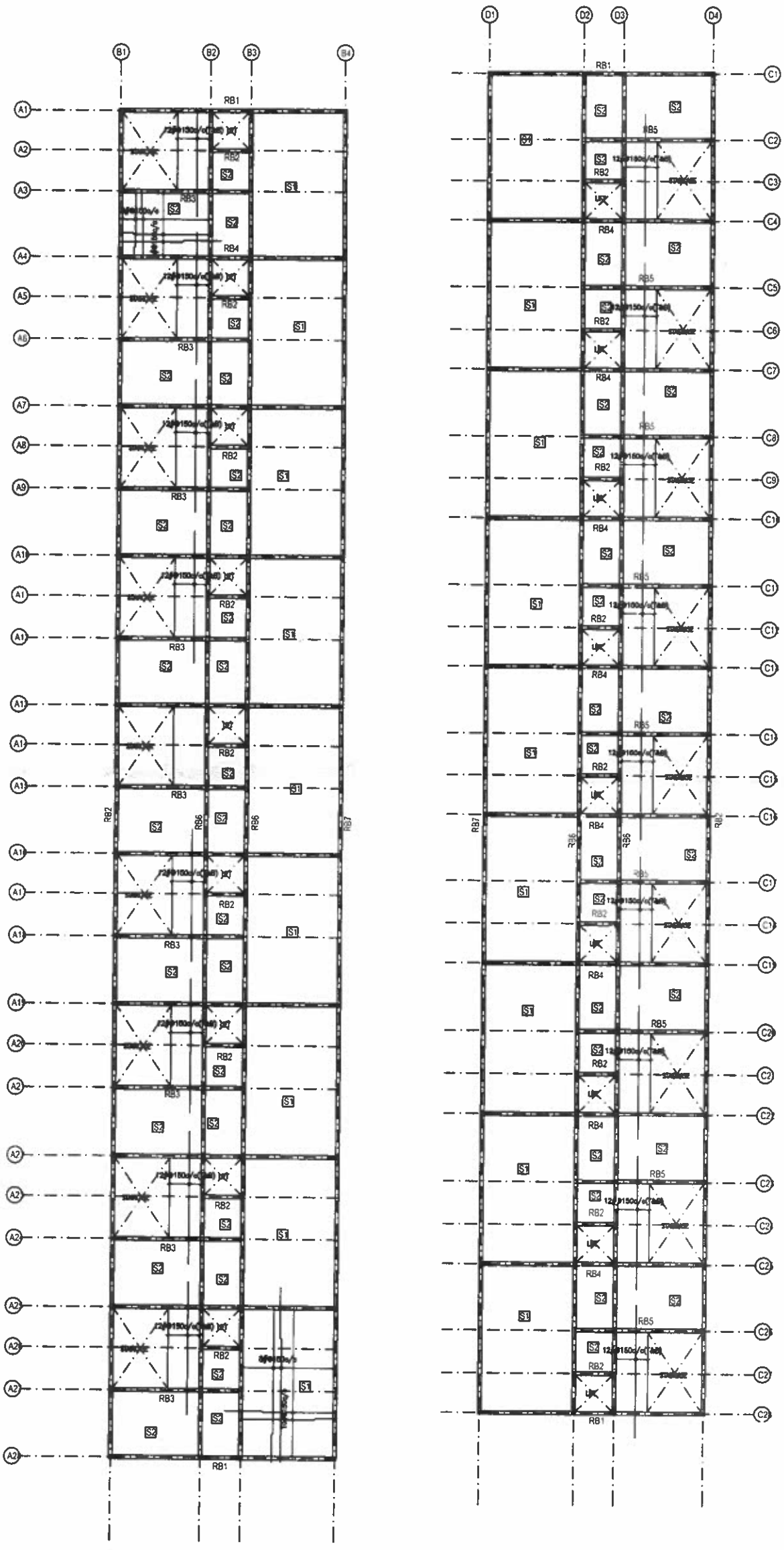


GF ROOF LAYOUT

NOTES

1. All dimensions are in mt.
2. Dimensions to be read, not scaled, Check in arch. dwg
3. Clear cover to the main reinf. as follows
   a) Col 25mm for 12mm bars & 40mm for >12mm
   b) Slab 20mm
   c) Beams 30mm
4. Use M30 Conc & Fe500 unless specified otherwise.
5. Slab thickness 125mm unless specified otherwise.
6. Crank length 0.2L of span.
7. Top rod extn. 0.3L of span.
8. Sunk the slab as per arch dwg.
9. Roof Levels refer to Arch. Drg.
10. Leave dowels/Sleeves wherever necessary.

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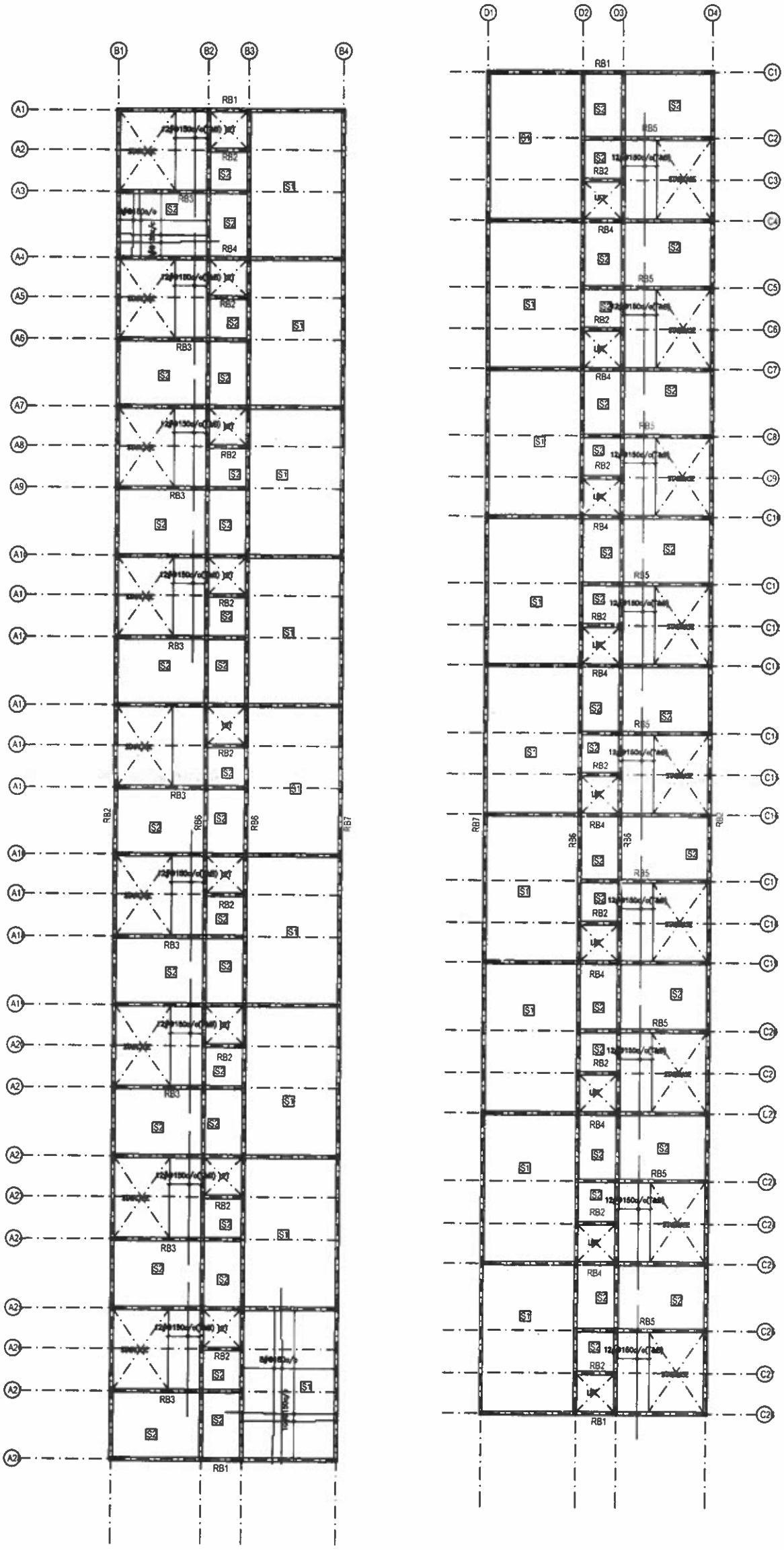


FF ROOF LAYOUT

NOTES

1. All dimensions are in mt.
2. Dimensions to be read, not scaled, Check in arch. dwg
3. Clear cover to the main reinf. as follows
   a) Col 25mm for 12mm bars & 40mm for >12mm
   b) Slab 20mm
   c) Beams 30mm
4. Use M30 Conc & Fe500 unless specified otherwise.
5. Slab thickness 125mm unless specified otherwise.
6. Crank length 0.2L of span.
7. Top rod extn. 0.3L of span.
8. Sunk the slab as per arch dwg.
9. Roof Levels refer to Arch. Drg.
10. Leave dowels/Sleeves wherever necessary.

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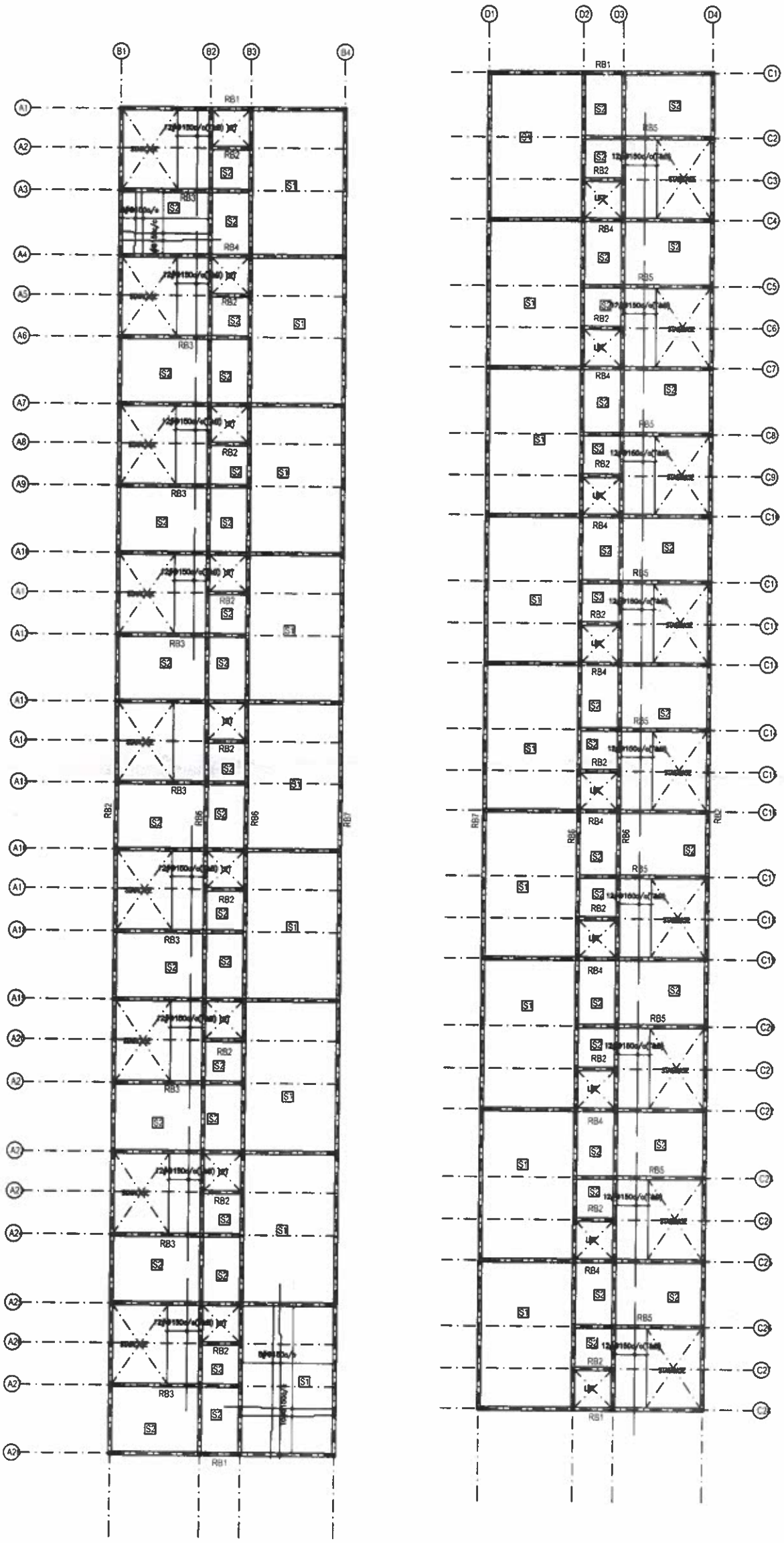


SF ROOF LAYOUT

NOTES

1. All dimensions are in mt.
2. Dimensions to be read, not scaled, Check in arch. dwg
3. Clear cover to the main reinf. as follows
   a) Col 25mm for 12mm bars & 40mm for >12mm
   b) Slab 20mm
   c) Beams 30mm
4. Use M30 Conc & Fe500 unless specified otherwise.
5. Slab thickness 125mm unless specified otherwise.
6. Crank length 0.2L of span.
7. Top rod extn. 0.3L of span.
8. Sunk the slab as per arch dwg.
9. Roof Levels refer to Arch. Drg.
10. Leave dowels/Sleeves wherever necessary.

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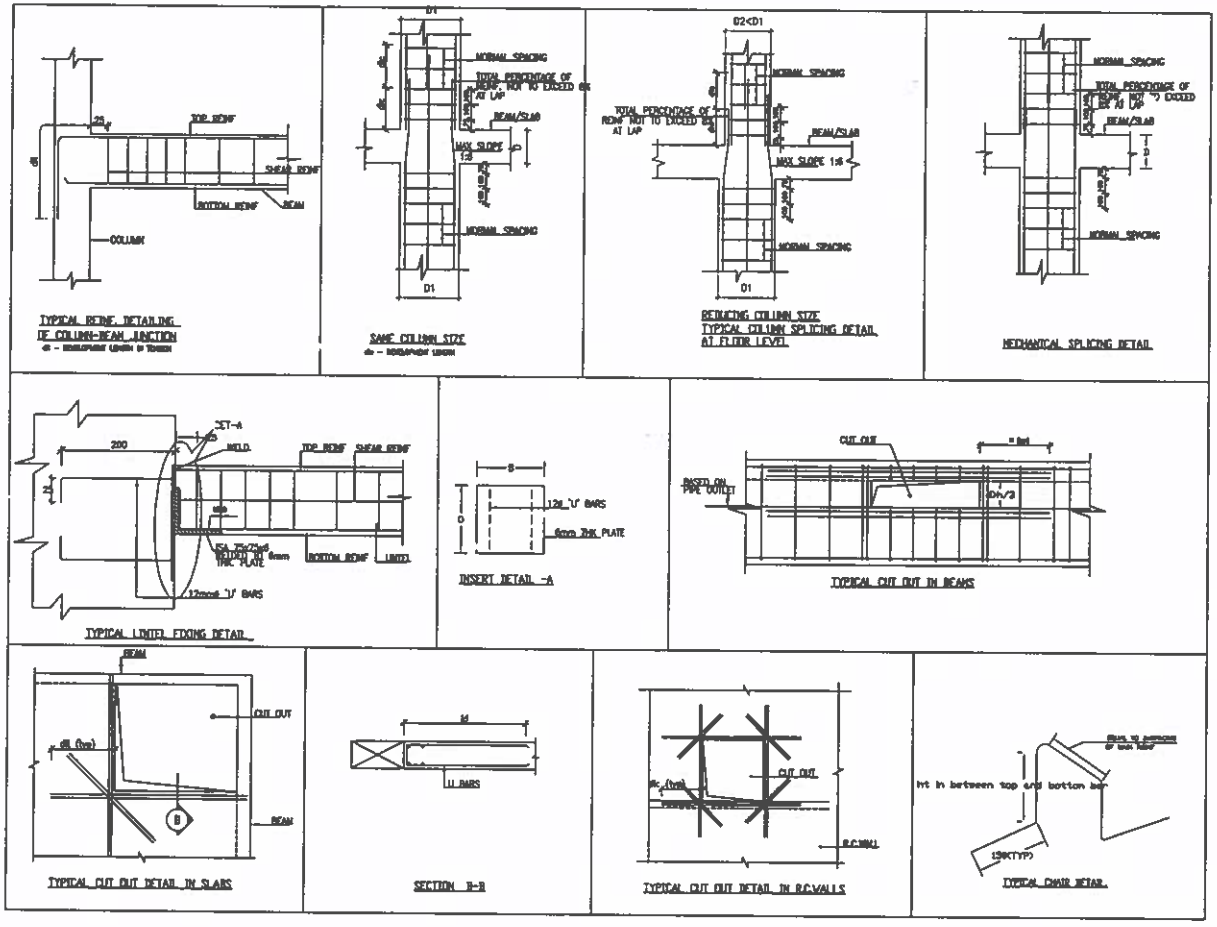
TF ROOF LAYOUT

NOTES

1. All dimensions are in mt.
2. Dimensions to be read, not scaled, Check in arch. dwg
3. Clear cover to the main reinf. as follows
   a) Col 25mm for 12mm bars & 40mm for >12mm
   b) Slab 20mm
   c) Beams 30mm
4. Use M30 Conc & Fe500 unless specified otherwise.
5. Slab thickness 125mm unless specified otherwise.
6. Crank length 0.2L of span.
7. Top rod extn. 0.3L of span.
8. Sunk the slab as per arch dwg.
9. Roof Levels refer to Arch. Drg.
10. Leave dowels/Sleeves wherever necessary.

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GENERAL DRAWING



GENERAL DETAILS

GENERAL NOTES

1. GENERAL

1.1 ALL DIMENSIONS ARE IN MM.

1.2 WORK TO FIGURED DIMENSIONS AND DO NOT SCALE THE DRAWING.

1.3 ALL STRUCTURAL DRAWINGS SHALL BE READ IN CONJUNCTION WITH RELEVANT ARCHITECTURAL AND SERVICE DRAWINGS.

1.4 ANY DISCREPANCY IN THE DRAWING SHALL BE BROUGHT TO THE NOTICE OF CONSULTANTS BEFORE COMMENCING THE WORK.

1.5 THE STRUCTURE IS DESIGNED FOR :
AS PER PLAN

2. DESIGN CRITERIA

2.0 STANDARDS AND LOADS.

2.1 THE CONCRETE DESIGN IS BASED ON IS: 456–2000.

2.2 LIVE LOADS ARE BASED ON IS:875 PART II:

a) GENERATORS

b) LIVE,ELECTRICAL PANNEL, EQIPMENT : 300 Kg/Sq.m
AS PER ACTUALS

c) STAIRS

d) TERRACES : 400Kg/Sq.m

2.3 SHUTTERING FOR FOOTING BY STEEL/PLYWOOD SHEETING.
SHUTTERING FOR COLUMN AND BEAMS BY STEEL/ PLYWOOD SHEETING.
SHUTTERING FOR SLABS BY STEEL/PLYWOOD SHEETING.

3. CONCRETE

3.1 ALL CONCRETE SHALL BE OF DESIGN MIX AND ARE TO BE OBTAINED FROM REPUTEDTESTING LABORATORIES AND APPROVED BY CONSULTANTS, THE MATERIALS THAT ARE PROPOSED TO BE USED IN THE PROJECT SHALL BE TESTED AND TEST CERTIFICATE TO BE FURNISHED BEFORE USE OF MATERIAL AT SITE.

3.2 IRRESPECTIVE OF WHAT MENTIONED ON DRAWING THE PCC MIX SHALL BE AS FOLLOWS.

I). PCC FOR PILE CAP / PLINTH BEAM / RAFT SLAB MIX 1:4:8

3.3 CANTILEVERED SLAB/BEAMS SHALL BE PROPPED TILL COUNTER BALANCING WEIGHT BECOMES EFFECTIVE.

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4. REINFORCING STEEL/DEVELOPMENT AND ANCHORAGE LENGTHS

4.1 ALL REINFORCEMENT STEEL SHALL CONFORM TO IS:1786 –1985 HIGH STRENGTH DEFORMED STEEL BARS,PRODUCED BY THE THERMO–MECHANICAL TREATMENT PROCESS, OF GRADE Fe500, HAVING ELONGATION MORE THAN 14.5% CAN BE USED

4.4 COUPLER CAN BE PROVIDED INSTEAD OF LAPPING.

Developed Length & Anchorage length

FOR Fe500 in mm	BAR IN TENSION M25	BAR IN COMPRESSION M25
10	485	388
12	583	466
16	777	621
20	971	777
25	1214	971

5. SOIL DATA & WATER TABLE

5.1 FOOTING CARRYING CAPACITY IS BASED ON SOIL REPORT.
5.2 MINIMUM DEPTH OF EXCAVATION SHALL BE AS INDICATED IN DRAWINGS.
5.3 FOR LIME SAND COMPACTION FILLING REFER ARCH DWG.
5.4 GROUND WATER LVL AS PER SOIL REPORT.

6. CONCRETE CLEAR COVER TO MAIN REINFORCEMENT

6.1 CONCRETE CAST AGAINST AND PERMANENTLY EXPOSED TO EARTH 75MM.

6.2 PILE --- 50MM (BOTTOM), 50MM (SIDES)
PILE CAP 75MM (BOTTOM), 75MM (TOP)
FOOTING 50MM (BOTTOM & SIDES)
LINTELS 20MM
BEAMS 30MM
COLUMNS 40MM >12#Rod & 25MM≤12#Rod
SLABS 20MM
RCC WALLS 40MM ON EARTH SIDE/WATER SIDE
20MM ON ATMOSPHERE SIDE

6.3 COVER BLOCKS SHALL BE USED TO GIVE CORRECT COVER TO REINFORCEMENT.

7. WATER PROOFING

7.1 WATER PROOFING SHALL BE DONE FOR : SUMP TANKS, OVERHEAD TANK, TOILET SLABS, TERRACE, LIFT RCC WALL, AS PER STANDARD SPECIFICATIONS.

8. CURING

8.1 CURING BY WATER SHALL BE DONE FOR ALL RCC STRUCTURE FOR A MINIMUM PERIOD OF 10 DAYS FOR OPC AND 12 DAYS FOR PPC CONCRETE.

9. DESHUTTERING TIME

9.1 TYPE OF FORM WORK FOR : — MINIMUM PERIOD BEFORE STRIKING (EXCLUDING THE DAY OF CASTING)

a. SLABS — 14 DAYS
b. BEAMS UPTO 6.0M — 14 DAYS
OVER 6.0M — 21 DAYS
c. WALL/COLUMN VERTICAL FACES — 1 DAY

9.2 SHUTTERING CAN BE RELEASED EARLIER THAN SPECIFIED ABOVE PROVIDED THE PROPS ARE RETAINED AT REASONABLE SPACINGS AND CONCRETE ATTAINS THE FULL STRENGTH AT THE TIME OF DESHUTTERING AS PER IS 456 – 2000. DESHUTTERING SHALL BE DONE BY PROVIDING DAMPENING MATERIAL BELOW IN ORDER TO REDUCE THE IMPACT AT THE LOWER LEVEL.

9.3 SIMPLY SUPPORTED AND CONTINUOUS SPANS SHALL BE DESHUTTERED FROM MID SPAN TOWARDS SUPPORTS.

CANTILEVERS SHALL BE DESHUTTERED FROM FREE END TOWARDS SUPPORTS

9.4 SLAB/BEAMS SHALL BE REPROPPED UNTIL THE NEXT LEVEL SLAB IS CAST AND DESHUTTERED.

10. CONSTRUCTION JOINTS

10.1 SLABS : AT MIDDLE ONE THIRD OF THE SPAN.
10.2 BEAMS : AT MIDDLE ONE THIRD OF THE SPAN. IF ANY CROSS BEAMS ARE LOCATED IN THIS REGION THE JOINT SHALL BE LOCATED TWO TIMES THE WIDTH OF THE BEAM AWAY FROM THE BEAM.

10.3 RETAINING WALL : AT THE JUNCTION OF THE WALL AND FOOTING WITH A KEY JOINT AND AT MIDDLE OF VERTICAL SPAN, VERTICAL JOINTS TO BE AVOIDED.

10.4 RAFT SLAB : AT MIDDLE ONE THIRD OF THE SPAN.

10.5 CANTILEVERS : CONSTRUCTION JOINT SHALL NOT BE PROVIDED IN CANTILEVERS.

10.6 AT CONSTRUCTION JOINTS OF WATER RETAINING STRUCTURES AND BASEMENTS: PRE FORMED PLASTIC WATER STOP (SYNKOFLEX OR EQUIVALENT) SHALL BE PROVIDED.

11. SLUMP OF CONCRETE

11.1 SLUMP OF CONCRETE SHALL RANGE BETWEEN 100 TO 180MM DEPENDING ON THE MANNER OF CONCRETING.

THE TABLE BELOW GIVE THE GENERAL GUIDANCE:

PILING	SLUMP(in mm) Min.	Max.	
A	100	180	POURING IN TO WATER–FREE UNLINED BORE HAVING WIDELY SPACED REINFORCEMENT. WHERE REINFORCEMENT IS NOT SPACED WIDELY ENOUGH, CUT–OFF LVL OF PILE IS WITHIN THE CASTING AND DIAMETER OF PILE IS LESS THAN OR EQUAL TO 600MM, HIGHER ORDER OF SLUMP WITH IN THIS RANGE MAY BE USED.
B	150	180	WHERE CONCRETE IS TO BE PLACED UNDER WATER OR DRILLING MUD BY TREMIE OR BY PLACER.

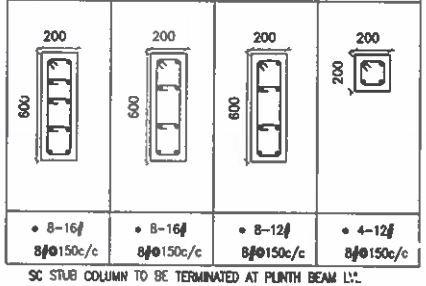
12. MISCELLANEOUS

12.1 ROD EQUAL AND ABOVE 20mm DOUBLE BINDING TO BE DONE.
12.2 CHAIR ROD TO BE PROVIDED AT PROPER SPACING NOT MORE THAN 3'0".
12.3 AT CONSTRUCTION JOINTS A COAT OF SBR–LATEX TO BE APPLIED BEFORE CONCRETING
12.4 COLUMN CAN BE RAISED AFTER 1 COMPLETE DAY FOR CONCRETING.

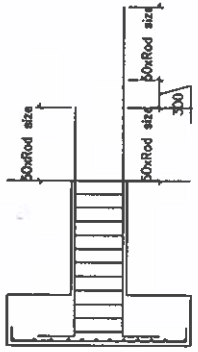
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FOUNDATION DETAILS (M30-Fe500)					
TYPE	LENGTH	BREADTH	D	LONG BAR	SHORT BAR
F1	2500	2500	500	10ϕ @ 100 c/c	10ϕ @ 100 c/c
F2	2000	2000	500	10ϕ @ 125 c/c	10ϕ @ 125 c/c
F3	1750	1750	500	10ϕ @ 125 c/c	10ϕ @ 125 c/c
SF	1000	1000	300	10ϕ @ 200 c/c	10ϕ @ 200 c/c
CF1	3500	3000	500	10ϕ @ 100 c/c(T&B)	10ϕ @ 100 c/c(T&B)
CF2	3500	2000	500	10ϕ @ 100 c/c(T&B)	10ϕ @ 150 c/c(T&B)
CF3	3500	1750	500	10ϕ @ 100 c/c(T&B)	10ϕ @ 150 c/c(T&B)

COLUMN DETAILS (M30-Fe500)

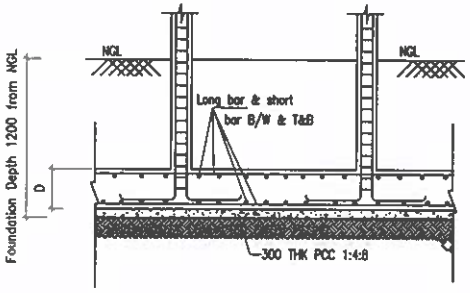


SC STUB COLUMN TO BE TERMINATED AT PLINTH BEAM LVL

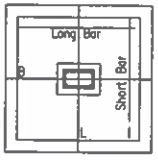


SECTION OF COLUMN FOR LAP

GA DRAWING NTS

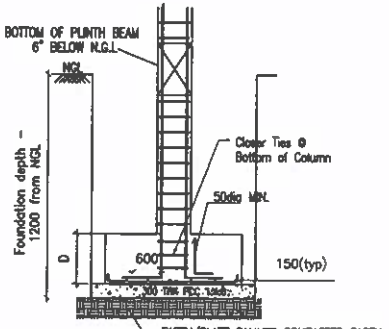


C.S. OF COMBINED FOOTING (TYP)



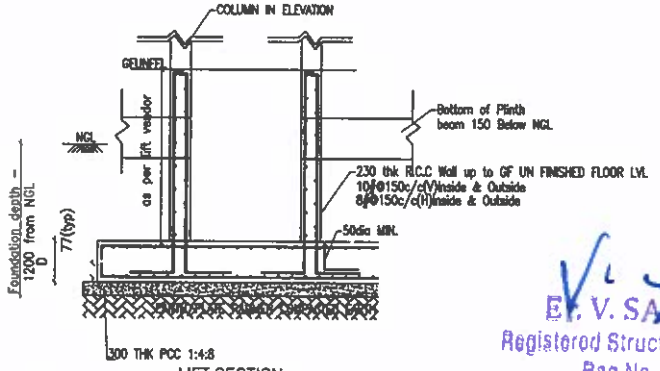
PLAN OF FOOTING DETAIL(TYP)

GA DRAWING NTS



C.S. OF FOOTING (TYP)

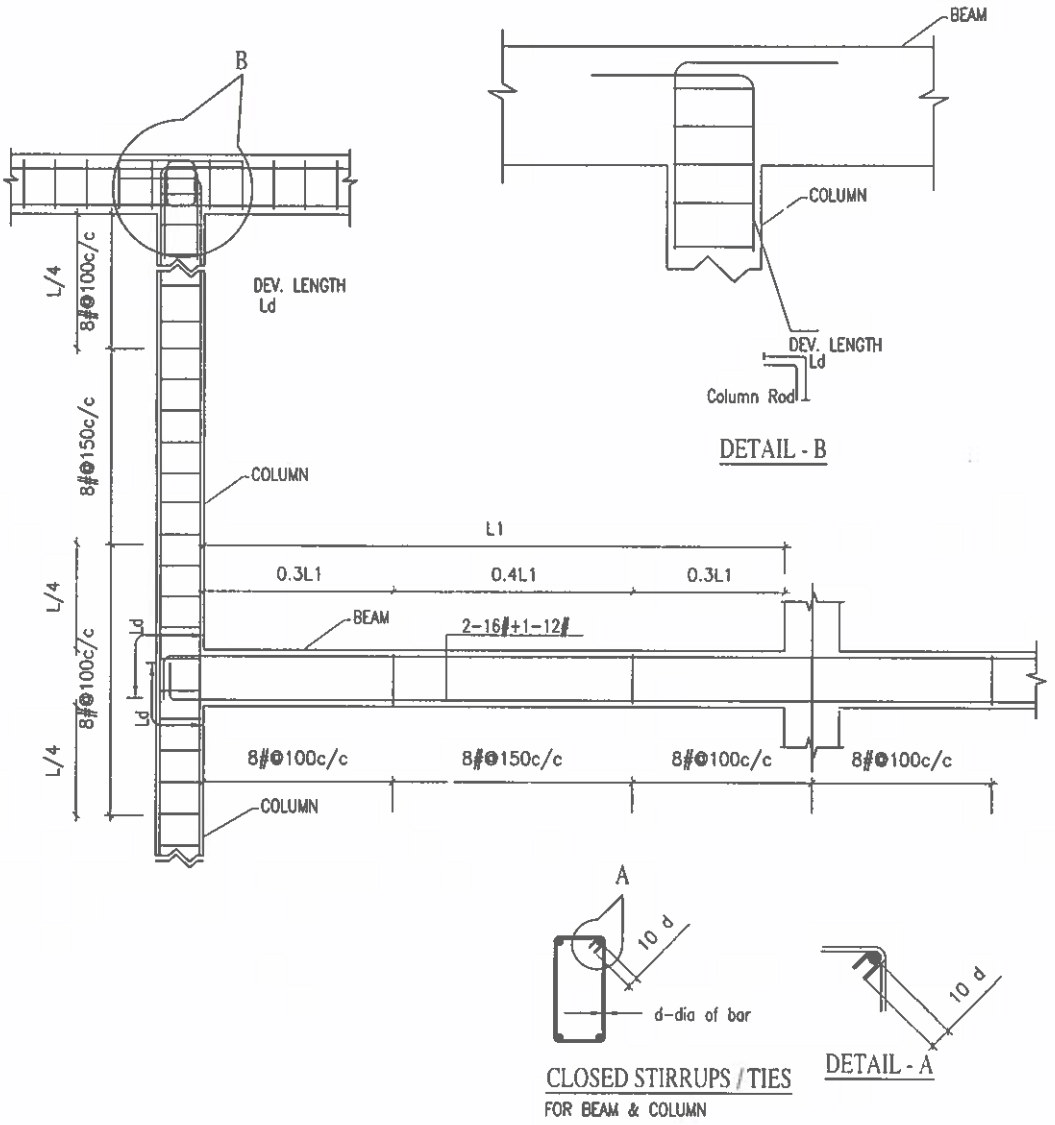
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LIFT SECTION

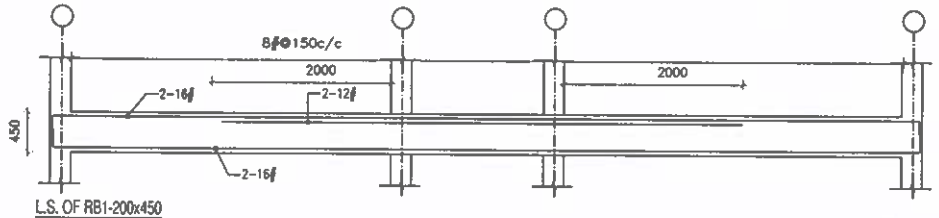
WATER PROOFING TO BE DONE AS PER MANUFACTURE SPECIFICATION

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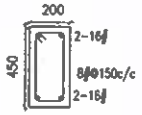


SEISMIC DETAILING

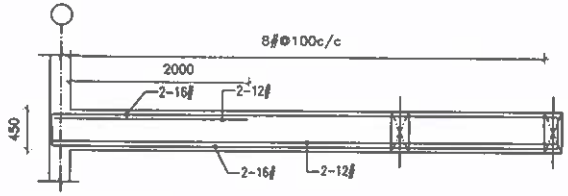
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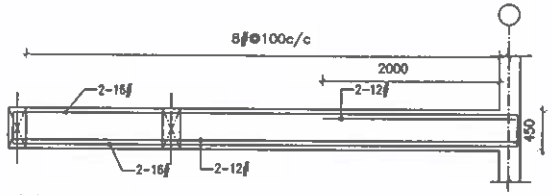
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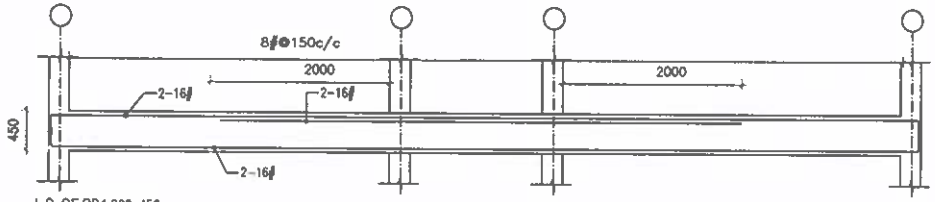
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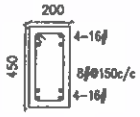
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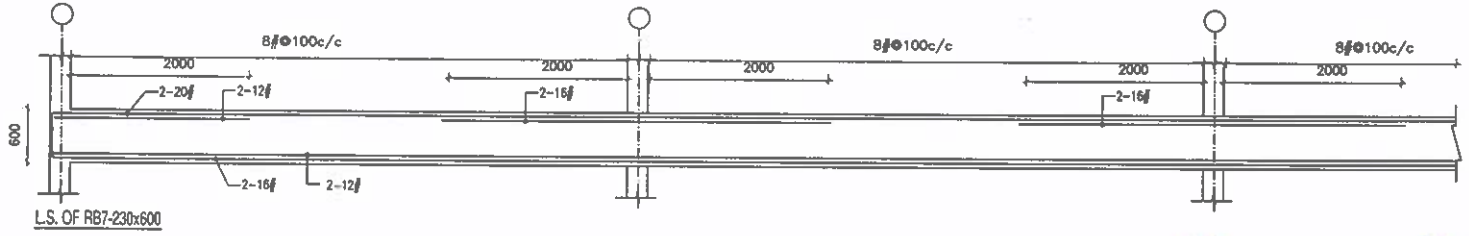
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L.S. OF RB4-200x450



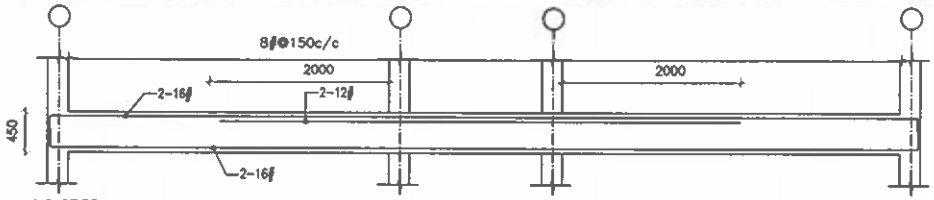
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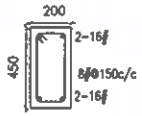
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GF ROOF LAYOUT

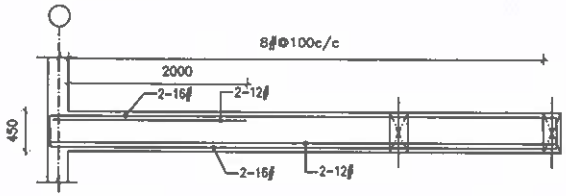
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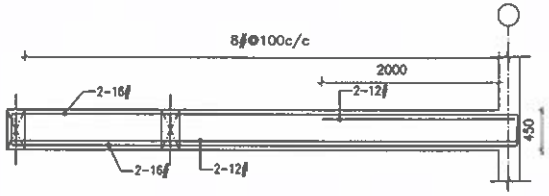
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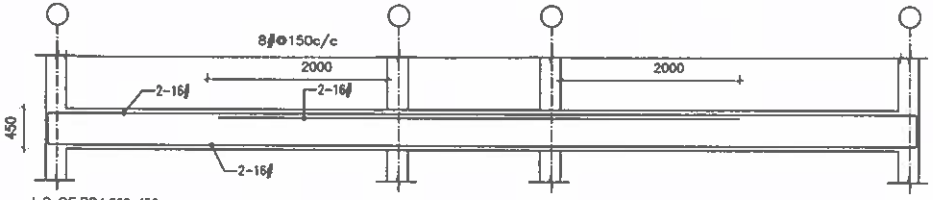
C.S OF RB2
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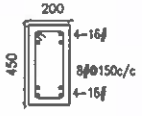
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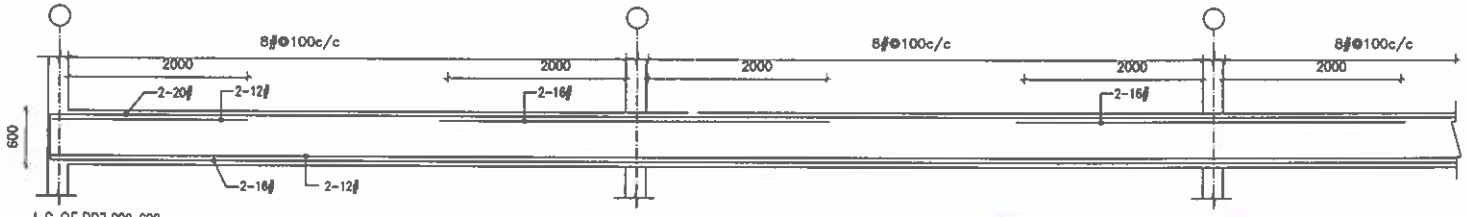
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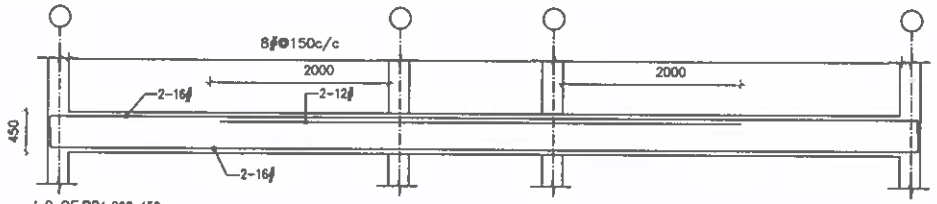
C.S OF RB6
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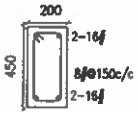
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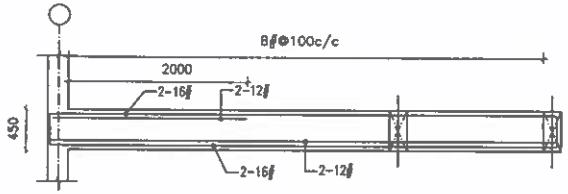
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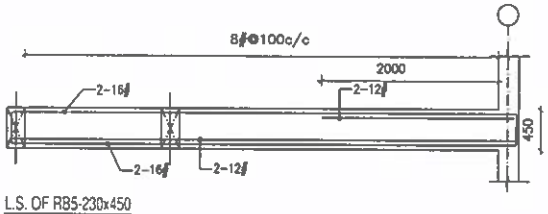
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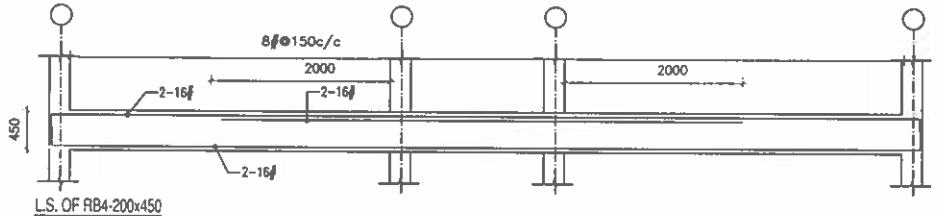
C.S OF RB2
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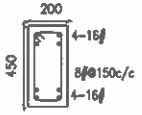
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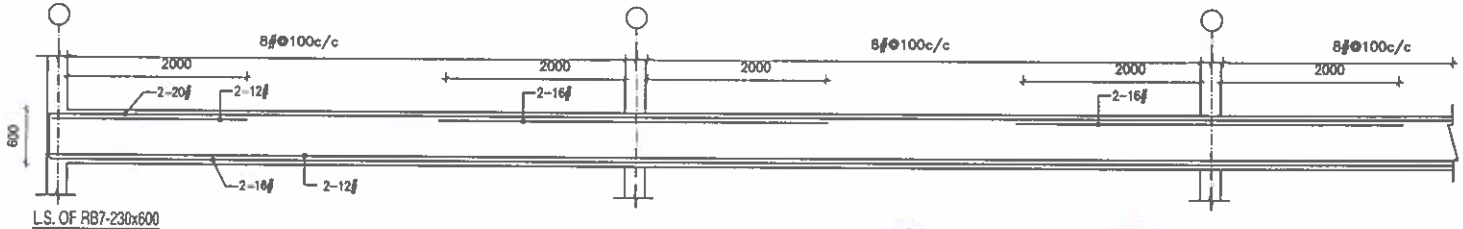
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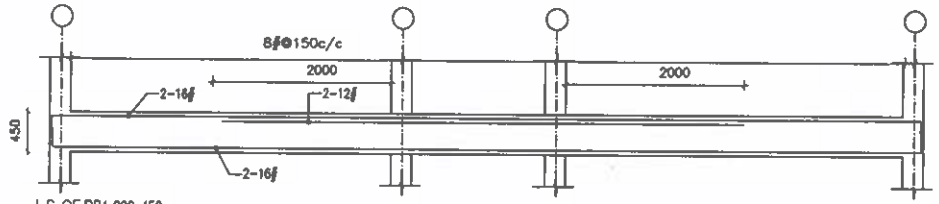
C.S OF RB6
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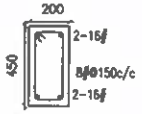
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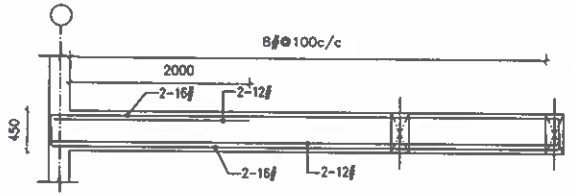
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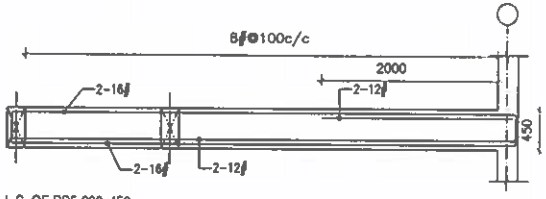
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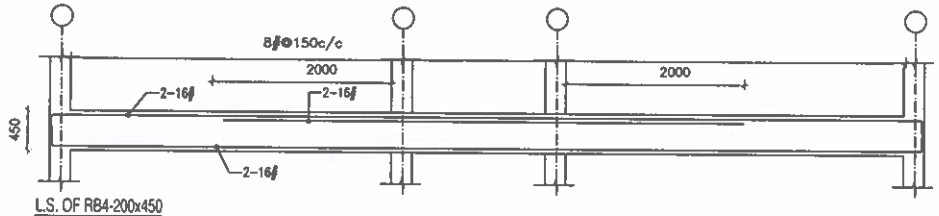
C.S OF RB2
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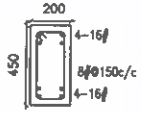
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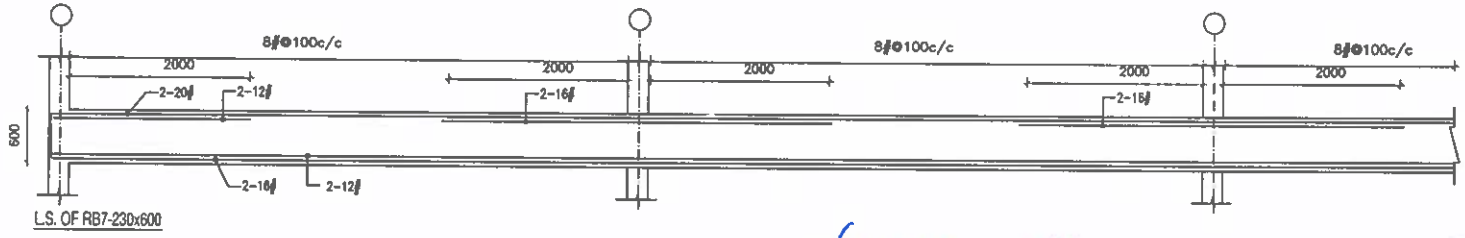
L.S. OF RB5-230x450



L.S. OF RB4-200x450



C.S OF RB6
200x450



L.S. OF RB7-230x600

TF ROOF LAYOUT

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THE LANDLENS SUITE

Eight ways to know a piece of land before you pay for it.

This report covers one part of the picture. These cover the rest, drawn from the same government records, for any property in Tamil Nadu.

LandLens One
Ask anything about a property and get an answer grounded in live government records, with the sources shown.
/landlens/one

Verify My Land
Every record check run on one property and returned as a single report.
/landlens/verify-my-land

Legal Opinion
An advocate's written opinion on the title, built on the records we pull for it.
/landlens

One Map
Every layer on one map: the parcel, its boundary, zoning, water bodies and what sits around it.
/landlens/one/map

PriceMap
What land actually changed hands for around this plot, taken from the registered deeds.
/landlens/pricemap

Build Scope
What you are allowed to build here: floor space, height, coverage and setbacks.
/landlens/build-scope

Property Tracker
Watch a property and hear about it when something new is registered against it.
/landlens/property-tracker

Deal Room
Run the transaction in one place: documents, stamping, signatures and the parties.
/landlens/deal-room

FREE TOOLS · NO ACCOUNT NEEDED

Twenty-four checks you can run yourself, at no cost.

Records and verification

The registers themselves, read for you.

- Encumbrance Certificate
- Patta and Chitta
- Field Measurement Sketch
- EC Analyzer
- Bank charge check
- Court case search
- Seller background check
- Approval check by survey

Value and duty

What it is worth and what it costs to register.

- Guideline value by street
- Guideline value by survey
- Stamp duty and registration fees
- Capital gains
- Floor space index
- Area unit converter

Zoning and land use

What the plan says can happen on this land.

- Land use zone finder
- CMDA land use check
- Coastal regulation zone
- Master plan check
- Water bodies finder
- Airport height clearance

Registers and directories

Who holds it, and which office keeps the record.

- Find your registering office
- Temple property check
- Waqf property check
- RERA register

Every free tool
/tools

Services we run for you
/services

The LandLens suite
/landlens/one

Verified RealEstate™

Every claim in this document traces back to a government record.

- Legal opinions, due diligence and title verification
- Building plan, layout and sub-division approvals
- Completion and occupancy certificates, regularisation
- Escrow, negotiation and NRI property management
- Land survey, soil testing, architecture and construction

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hello@verified.realestate
+91 9996 12 9996

Prepared from the registers named on the page each finding sits on. Where a register could not be read, this document says so in its place rather than leaving the gap to be read as a clean result.